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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/669,055	09/24/2003	Yoshiaki Noda	NOG-0017	3382

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EXAMINER	
ARANCIBIA, MAUREEN GRAMAGLIA	
ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 02/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/669,055	NODA ET AL.	
	Examiner	Art Unit	
	Maureen G. Arancibia	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5 and 16 rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 4,925,542 to Kidd.

Kidd teaches a plasma processing device comprising: a chamber 1; a process target 23; an exhaust mechanism 18 that lowers the chamber pressure below atmospheric pressure (Column 5, Lines 28-30); a process gas introducing mechanism (source 20, valve 22); an active electrode 5 and an earth electrode 9, located opposite one another (Figure 1); a plasma generating power supply 15 connected to the active electrode; and an electrically conductive path 21 connected to the target 23 via target holder 7 (Column 7, Lines 58-60). The target is disposed outside the space between the two electrodes. (Figure 1)

Note that the recitation of intended use of the claimed apparatus for cleaning has been considered, but does not have patentable weight. See MPEP § 2114. The apparatus taught by Kidd would be capable of cleaning the process target.

In regards to Claim 2, Kidd teaches that the target is disposed at the other side of the earth electrode 9 from the active electrode 5. (Figure 1)

In regards to Claim 3, the electrically conductive path 21 is provided with an auxiliary power supply 19.

In regards to Claims 4 and 5, the auxiliary power supply 19 is a variable DC power supply. (Column 7, Lines 50 and 63)

In regards to Claim 16, the particular type of gas used is a process limitation rather than an apparatus limitation, and the recitation of a particular type of gas does not limit an apparatus claim, see *In re Casey,* 152 USPQ 235; *In re Rishoi,* 94 USPQ 71; *In re Young,* 25 USPQ 69; *In re Dulberg,* 129 USPQ 348; *Ex parte Thibault,* 64 USPQ 666; and *Ex parte Masham,* 2 USPQ2d 1647. This rejection is based on the fact the apparatus structure taught by Kidd has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on the inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP § 2112).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 6 and 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kidd in view of U.S. Patent 6,178,919 to Li et al.

The teachings of Kidd were discussed above.

In regards to Claim 6, Kidd does not expressly teach that the auxiliary power supply can be AC.

Li et al. teaches that an auxiliary power supply 212 can be AC. (Column 4, Lines 62-64)

It would have been obvious to one of ordinary skill in the art to make the auxiliary power supply taught by Kidd an AC power supply. The motivation for doing so, as taught by Li et al. (Column 3, Lines 41-42), would have been to aid in accelerating ions toward the substrate to be etched.

In regards to Claim 13, Kidd does not expressly teach an insulating cover disposed in the chamber, covering the pair of opposite electrodes and process target, and having an opening to allow flow of the process gas.

Li et al. teaches that an insulating cover can be provided in a plasma chamber to confine the plasma to a specific volume, and dimensioned according to the volume needed. (Column 7, Lines 60-63)

It would have been obvious to one of ordinary skill in the art to provide an insulating cover in the chamber taught by Kidd. The motivation for doing so, as taught by Li et al. (Column 7, Lines 63-66), would have been to control the volume of the plasma, making etching more uniform. The motivation for making it of a size to cover the pair of opposite electrodes and the target taught by Kidd would have been to contain the plasma within this crucial volume of the chamber. The motivation for providing an opening for the flow of process gas would have been to allow the process gas to reach the plasma electrodes.

5. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kidd in view of U.S. Patent 4,792,727 to Godyak.

The teachings of Kidd were discussed above.

Kidd does not teach a resistor, diode, or both connected in series between the auxiliary power supply and process target, the diode oriented such that the process target side is the anode.

Godyak teaches that a diode D1 and resistor R1 can be provided in series between an auxiliary power supply 13 and an electrode A. (Figure 1)

It would have been obvious to one of ordinary skill in the art to provide a diode and resistor in series with the auxiliary power supply taught by Kidd, with the diode oriented such that the process target side is the anode. The motivation for providing the resistor would have been to control the amount of current provided to the process target. The motivation for providing a diode, as taught by Godyak (Column 2, Line 30), would have been that it is a unilateral conducting means; in other words, providing a diode allows the target to be biased. The motivation for orienting the diode such that the process target side is the anode would have been to increase the attraction of positively charged ions in the plasma to the target.

6. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kidd in view of the English abstract and Figures of Japanese Unexamined Patent Application Publication 62-267483 to Ito et al.

The teachings of Kidd were discussed above.

Kidd does not expressly teach that the auxiliary power supply can be provided with a protective circuit comprising a resistor and capacitor in parallel to each other and the auxiliary power supply.

Ito et al. teaches that an auxiliary power source 10 can be provided with a parallel circuit of a resistor 9 and a capacitor 12 in parallel with each other. (Figure 1)

It would have been obvious to one of ordinary skill in the art to modify Kidd to include a parallel circuit of a resistor and capacitor in parallel to each other and the auxiliary power supply. The motivation for doing so, as taught by Ito et al. (English abstract, Purpose) would have been to provide an auxiliary power circuit that prevents the substrate from being damaged.

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kidd in view of U.S. Patent 4,282,077 to Reavill.

The teachings of Kidd were discussed above. Note that Kidd teaches that the process target is connected to an electrically conductive path, as discussed above.

Kidd does not expressly teach plural sets of the pair of electrodes and process target can be provided in a partitioned chamber.

Reavill teaches a partitioned plasma chamber 36 with plural sets of opposite electrodes and process targets (76, 78, 80, 82). (Figure 2) The active electrodes are connected in parallel. (Figure 2) Each of the subspaces is individually controllable. (Column 3, Lines 11-13)

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by Kidd to include plural sets of opposite electrodes and process

targets, as taught by Reavill, with each subspace being individually controlled. The motivation for including plural sets of electrodes and targets would have been to increase apparatus throughput. The motivation for connecting the active electrodes in parallel would have been to use a single power supply to drive them. The motivation for making each subspace individually controlled, as taught by Reavill (Column 3, Lines 14-16), would have been to make the etching of each target more uniform.

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kidd in view of Reavill as applied to claim 14 above, and further in view of the figures of Japanese Patent 2574852B2 (Japanese '852).

The teachings of Kidd and Reavill were discussed above. Specifically, the combination of Kidd and Reavill teaches that the active electrodes are connected in parallel with each other. (See discussion of Claim 14 above.)

The combination of Kidd and Reavill does not expressly teach that each active electrode should be provided with a corresponding resistor.

Japanese '852 teaches that electrodes 11, 11a, 11c connected in parallel to each other and supplied with a power source 7 should each be provided with corresponding resistors 8b, 8a, 8c. (Figure 1)

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by the combination of Kidd and Reavill to provide each electrode with a corresponding resistor. The motivation for doing so would have been to individually optimize the current flow to each electrode while only having to provide one power source.

9. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kidd in view of U.S. Patent 5,203,958 to Arai et al.

The teachings of Kidd were discussed above.

Kidd does not expressly teach that the inlet port for the process gas can be provided to the vent pipe of the chamber.

Arai et al. teaches that an inlet port 17 can be provided to a vent pipe 19.

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by Kidd to provide the inlet port to the vent pipe for the chamber. The motivation for doing so, as taught by Arai et al. (Column 5, Lines 40-42), would have been to constantly maintain the interior of the vented space (i.e. the chamber) at a predetermined pressure)

10. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kidd in view of U.S. Patent 4,624,767 to Obinata.

The teachings of Kidd were discussed above.

Kidd does not expressly teach a reflecting electrode in an electrically floating state at the other side of the active electrode from the earth electrode.

Obinata teaches an electrically floating reflecting electrode 9. (Column 2, Lines 41-50)

It would have been obvious to one of ordinary skill in the art to provide the apparatus taught by Kidd with an electrically floating reflecting electrode, positioned on the far side of the active electrode. The motivation for making this modification, as taught by Obinata (Column 2, Lines 45-54), would have been to help contain the plasma

in the space between the active electrode and the earth electrode and target, without having to supply additional power to the active electrode.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 5,935,455 to Glejboel teaches the use of diodes to bias an electrode in a plasma apparatus.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on core hours of 11-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (571) 272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Maureen G. Arancibia

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